PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AJE-2.209.OW	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/US04/37823	International filing date *(day/month/year)* 12 November 2004 (12.11.2004)	Priority date *(day/month/year)* 17 November 2003 (17.11.2003)
International Patent Classification (IPC) or national classification and IPC IPC(7): D01F 1/48 and US Cl.: 162/374, 352		
Applicant ASTENJOHNSON, INC.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 6 sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____ , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
03 August 2005 (03.08.2005)	20 November 2005 (20.11.2005)
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Steven Griffin Telephone No. 571-272-1700

Form PCT/IPEA/409 (cover sheet)(April 2005)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US04/37823

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

☐ the international application in the language in which it was filed.

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1(b))

☐ publication of the international application (under Rule 12.4(a))

☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☒ the international application as originally filed/furnished

☒ the description:
pages 2-12 as originally filed/furnished
pages* 1 received by this Authority on 03 August 2005
pages* _____ received by this Authority on _____

☒ the claims:
pages NONE as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 13-17 received by this Authority on 03 August 2005
pages* _____ received by this Authority on _____

☐ the drawings:
pages _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing (*specify*): _____
☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing (*specify*): _____
☐ any table(s) related to the sequence listing (*specify*): _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US04/37823

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 6-33	YES
	Claims 1-5	NO
Inventive Step (IS)	Claims NONE	YES
	Claims 1-33	NO
Industrial Applicability (IA)	Claims 1-33	YES
	Claims NONE	NO

2. Citations and Explanations (Rule 70.7)

Claims 1-5, lack novelty under PCT Article 33(2) as being anticipated by Buchanan (3,446,702). Buchanan discloses a papermaking apparatus drainage foil 24 supporting a wire as the wire is moving in the direction of the arrow, which is the machine direction. The drainage foil 24 comprises a plurality of drainage foils 26 which are separated from each other in a plurality of rows in the machine direction and also separated from each other in the cross direction. Drainage foils 26 are removably attached to traversely extending fixed support member 28. Each of the foils 26 is made of a ceramic material. The foil also includes a plurality of wear insert supporting and wiping elements 38A, which extend over the total width of the wire.

Claims 6-33, lack an inventive step under PCT Article 33(3) as being obvious over Buchanan in view of Gatke (2,957,522). Buchanan is applied as above for claims 1-5. Gatke discloses the dewatering box attached to a suction source and the suction box cover having the zigzag shape. It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Buchanan and Gatke, because such a combination would provide for a cover and a dewatering box having improved drainage and wear resistant structure.

Claims 1-33, meet the criteria set out in PCT Article 33(4), and thus meet industrial applicability because the subject matter claimed can be made or used in industry.

[0001] SHAPED SLOT VACUUM DEWATERING BOX COVER

[0002] BACKGROUND

[0003] The present invention concerns a vacuum assisted dewatering box for use in a papermaking machine, such as a Uhle box, a felt suction box, or other types of suction boxes which assist in dewatering the sheet and the fabric upon which it is conveyed in the papermaking machine. In particular, the invention is directed to a dewatering box cover, wherein the cover is comprised of a plurality of block type components which are assembled in a desired manner.

[0004] During the process of making paper in a modern papermaking machine, a highly aqueous slurry of about 99% water and about 1% cellulosic fibers is ejected at high velocity either onto an endless moving forming fabric in a single fabric forming arrangement, or in between two converging forming fabrics in a two fabric layout. The fabric or fabrics will pass over one or more vacuum assisted dewatering boxes, typically called a suction box in the fourdrinier section of a papermaking machine, to assist in water removal and consolidate the slurry into a nascent sheet. Upon leaving the forming section, the newly formed sheet has a very high water content of about 75 – 80%, the remainder being solids. The embryonic sheet is then transferred to the press section where it contacts at least one press fabric which carries it through one or more press nips where further water is pressed from the sheet by mechanical means and passes into the press fabric. The press fabric passes over at least one vacuum assisted dewatering box, typically referred to as a Uhle box in the press section, where water and contamination is removed from the fabric. The sheet, which now typically has a moisture content of about 45 – 35% continues into the dryer section where the remainder of its water is removed by evaporative means.

Vacuum assisted dewatering boxes are also utilized in other, similar continuous processes, such as in the manufacture of multi-ply boards. In these processes, the sheet is formed in layers and the fabric(s) carry the sheet through several presses where it is dewatered and eventually dried.

IN THE CLAIMS

1. A cover for a vacuum dewatering box, comprising:

a plurality of blocks each including a wear surface, the blocks are arranged in at least one cross direction (CD) row and are spaced apart from one another in the cross direction to form at least one generally CD oriented non-linear shaped slot through the cover, a shape and size of the at least one slot being determined by at least one of a location of and a shape of the blocks.

2. The cover for a vacuum dewatering box of claim 1, wherein the blocks are supported by at least one CD extending support.

3. The cover for a vacuum dewatering box of claim 1, wherein the wear surface of each of the blocks comprises a wear resistant element, and the wear resistant element is mounted in a support component.

4. The cover for a vacuum dewatering box of claim 1, wherein the blocks are supported by at least one CD extending support, and the blocks are aligned by at least one of a rod or a groove oriented generally parallel to the at least one longitudinally extending support.

5. The cover for a vacuum dewatering box of claim 1, wherein the cover includes first, second and third CD extending supports, a first group of the blocks are located between the first and second CD extending supports, and a second group of blocks are located between the second and third CD extending supports, at least some of the blocks of the first group are spaced apart from one another, and at least some of the blocks in the second group are spaced apart from one another and located in offset positions from the blocks of the first group.

6. The cover for a vacuum dewatering box of claim 5, wherein the blocks are arranged so that the at least one slot has a generally zigzag-shaped appearance extending in the CD.

7. The cover for a vacuum dewatering box of claim 5, wherein the blocks are arranged so that the at least one slot has a herringbone appearance extending in the CD.

8. The cover for a vacuum dewatering box of claim 5, wherein there is at least one additional CD extending support and at least one additional group of blocks located between the additional CD extending support and one of the other CD extending supports, and at least some of the blocks in the additional group are spaced apart from one another and located in offset positions from at least some of the blocks of the first or second groups.

9. The cover for a vacuum dewatering box of claim 5, wherein there is a plurality of generally CD oriented slot through the cover.

10. The cover for a vacuum dewatering box of claim 1, wherein the cover includes 2n +1 CD extending supports and 2n groups of blocks, where n is an integer greater than or equal to 1, each of the groups of the blocks are separately located between successive adjacent ones of the CD extending supports, at least some of the blocks in each of the 2n groups are spaced apart from one another, and at least some of the blocks in a first of the 2n groups of blocks are located in offset positions from at least some of the blocks of a second of the 2n groups of blocks.

11. The cover for a vacuum dewatering box of claim 1, wherein the box is one of a suction box or a Uhle box for a papermaking machine.

12. The cover for a vacuum dewatering box according to claim 11, wherein the fabric bearing wear surface of the blocks is formed of a ceramic material.

13. The cover for a vacuum dewatering box according to claim 11, wherein the blocks are formed entirely of a ceramic material.

14. The cover for a vacuum dewatering box according to claim 11, wherein the blocks include a ceramic coating located on a wear side.

15. A vacuum dewatering box for a papermaking machine, comprising:

a box with an interior adapted to be connected to a vacuum source, the box being adapted for installation in a cross direction (CD) across at least a portion of a papermaking machine;

a cover located on the box, the cover being formed from a plurality of blocks each including a fabric bearing wear surface, the blocks are arranged in at least one CD row and are spaced apart from one another in the CD to form at least one generally CD oriented non-linear shaped slot in communication with the interior of the box, a shape and size of the at least one slot being determined by at least one of a location of and a shape of the blocks.

16. The vacuum dewatering box according to claim 15, wherein the blocks are attached to at least one CD support by mechanical fasteners.

17. The vacuum dewatering box according to claim 15, wherein the blocks are attached to at least one CD support by at least one of bonding, welding, and adhesives.

18. The vacuum dewatering box of claim 15, wherein the fabric bearing wear surface of each of the blocks comprises a wear resistant element, and the wear resistant element is mounted in a support component.

19. The vacuum dewatering box of claim 18, wherein the support component comprises a fiberglass, stainless steel or UHMW material.

20. The vacuum dewatering box of claim 18, wherein the support component of each of the blocks includes a channel to receive the wear resistant element.

21. The vacuum dewatering box according to claim 15, wherein the blocks are arranged so that the at least one slot has a generally zigzag-shaped appearance.

22. The vacuum dewatering box according to claim 15, wherein the blocks are supported by at least one CD support, and the blocks are aligned by at least one of a rod or a groove oriented generally parallel to the at least one CD support.

23. The vacuum dewatering box of claim 22, wherein each of the blocks is supported by two of the CD supports, one of the CD supports extending along each longitudinal side of each of the blocks, the CD supports each including at least one of a longitudinally extending groove or projection, and each of the blocks including at least one of a complementary located groove or projection so that the blocks are positively engaged and held in position by the CD supports.

24. The vacuum dewatering box of claim 22, wherein the projection on the CD support is formed by a rod located in a groove in the CD support that protrudes outwardly.

25. The vacuum dewatering box according to claim 15, wherein the cover includes first, second and third CD supports, a first group of the blocks are located between the first and second CD supports, and a second group of blocks are located between the second and third CD supports, at least some of the blocks of the first group are spaced apart from one another, and at least some of the blocks in the second group are spaced apart from one another and located in offset positions from the blocks of the first group.

26. The vacuum dewatering box of claim 25, wherein there is at least one additional CD extending support and at least one additional group of blocks located between the additional CD extending support and one of the other CD extending supports, and at least some of the blocks in the additional group are

spaced apart from one another and located in offset positions from at least some of the blocks of the first or second groups.

27. The vacuum dewatering box of claim 15, wherein there is a plurality of generally CD oriented slot through the cover.

28. The vacuum dewatering box of claim 15, wherein the cover includes 2n +1 CD extending supports and 2n groups of blocks, where n is an integer greater than or equal to 1, each of the groups of the blocks are separately located between successive adjacent ones of the CD extending supports, at least some of the blocks in each of the 2n groups are spaced apart from one another, and at least some of the blocks in a first of the 2n groups of blocks are located in offset positions from at least some of the blocks of a second of the 2n groups of blocks.

29. The vacuum dewatering box according to claim 15, wherein the blocks are arranged so that the at least one slot has a herringbone appearance.

30. The vacuum dewatering box according to claim 15, wherein the fabric bearing wear surface of the blocks is formed of a ceramic material.

31. The vacuum dewatering box according to claim 15, wherein the blocks are formed entirely of a ceramic material.

32. The vacuum dewatering box according to claim 15, wherein the blocks include a ceramic coating located on a wear side.

33. The vacuum dewatering box of claim 15, wherein the vacuum dewatering box is a suction box or a Uhle box for a papermaking machine.